

# PATENT SPECIFICATION

NO DRAWINGS

1,182,099



1,182,099

Inventor: VLADIMIR TIBENSKY

Date of Application (No. 7945/68) and filing Complete Specification: 19 February, 1968.

Application made in Czechoslovakia (No. 2481) on 6 April, 1967.

Complete Specification Published: 25 February, 1970.

Index at Acceptance:—C2 C 3A18.

International Classification:—C 13 k 9/00.

## COMPLETE SPECIFICATION

### A Method of Preparation of L-Arabinose

We, SLOVENSKA AKADEMIA VIED, a Czechoslovakian Corporation, of Bratislava, Czechoslovakia, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:

This invention relates to a method of preparation of L-arabinose. More particularly, the present invention relates to a method of preparation of L-arabinose from sweetened off sugar beet slices by hydrolysis of the araban present.

L-arabinose may be prepared by partial acid hydrolysis of plant gums, and by enzymic or acid hydrolysis of sugar beet with acid hydrolysis of the araban present. It is not known at present, whether any of these methods is being used on a larger scale than in a laboratory preparation.

A previously described method of preparation of arabinose from sugar beet makes use of the effect of a 1% solution of sulphuric acid and heat on crushed sugar beet. The resulting steep liquor is neutralized using barium carbonate and subsequently it is clarified by lead acetate. A direct hydrolysis of araban in sugar beet is advantageous; however, the expected yields are not obtained.

By this method the solution yields, apart from arabinose, also a certain amount of glucose and fructose, and, primarily, a considerable amount of pectin. For clarification, a large amount of poisonous lead acetate is utilized, the surplus of which must be carefully removed. Various salts remain in the solution and they are responsible for further difficulties in preparation.

An object of the present invention is to obviate or mitigate disadvantages inherent in prior methods of preparation of L-arabi-

nose.

The present invention relies on the limitation of diffusion of pectin from sugar beet into the extract, followed by elimination of other saccharides and effective clarification of the steep liquor.

According to the present invention there is provided a method of preparing L-arabinose, comprising deesterifying pectin in sliced sugar beet by means of acid or alkali, hydrolysing the mixture with acid, separating residual material, neutralizing the liquid from the hydrolysed mixture, separating any precipitate formed, eliminating saccharides accompanying L-arabinose in the liquid from the hydrolysed mixture, concentrating the mixture, clarifying the concentrated mixture by means of a saturated monohydric alcohol having from 1 to 4 carbon atoms, and crystallizing L-arabinose from the resultant alcoholic solution.

It has been found that pectin bound in sugar beet slices treated by acid or alkaline deesterification, has its diffusion into the solution decreased in proportion to swelling of the slices. In general, in the method of this invention, after hydrolysis and neutralization, glucose and fructose are eliminated from solution under the action of yeasts. After concentration, the solution is freed from ballast matter (partially degraded molecules and ash matter) using an alcohol, preferably methanol or ethanol and preferably heated. L-arabinose freely crystallizes from the concentrated clarified solution obtained in this manner.

To illustrate the invention, the following examples are given:

#### Example 1

Dry sugar beet slices are stirred with a 10-fold weight of water and 0.4-0.5% by weight CaO, and the mixture is allowed to react for about 2 hours. Following this, the

[Price 5s. 0d.]

suspension is neutralized and sulphuric acid is added in order to provide an approximately 3% solution. The mixture is then heated at 80°C or higher for a period of four or more hours, the liquid is then filtered and neutralized by lime or calcium carbonate. After the precipitate is removed, glucose, and fructose are fermented using either brewers yeast or bakers yeast and the solution is concentrated at reduced pressure to a dry matter content of 65-75%. A three to five fold volume of preferably hot, ethanol or methanol is added, the mixture is well-stirred, impurities are filtered off and the alcoholic solution is concentrated to 60% or more of dry matter. The arabinose crystallizes spontaneously after a few hours under normal temperature conditions. The crystals are centrifuged or filtered off, washed with suitably cooled methanol and are dried, to yield over 3% of L-arabinose based on the weight of the slices. The crystallization syrup still contains approximately 3% or arabinose but to obtain it a more complicated procedure is necessary.

#### Example 2

Pectin in dry sugar beet slices is deesterified and hydrolysis of the araban present is effected by mixing slices with a hot solution of 3-4% sulphuric acid. The procedure after the hydrolysis step is the same as described in Example 1. By this procedure, which is simpler, more ballast matter is extracted and the residue from the slices is of a more pasty nature.

An advantageous procedure for use in hydrolyzing the slices after deesterification is to treat the slices under a counter-flow of acid, preferably dilute sulphuric acid.

#### WHAT WE CLAIM IS:—

1. A method of preparing L-arabinose, comprising deesterifying pectin in sliced

sugar beet by means of an acid or alkali, hydrolysing the mixture with acid, separating residual material, neutralizing the liquid from the hydrolysed mixture, separating any precipitate formed, eliminating saccharides accompanying L-arabinose in the liquid from the hydrolysed mixture, concentrating the mixture, clarifying the concentrated mixture by means of a saturated monohydric alcohol having 1 to 4 carbon atoms, and crystallizing L-arabinose from the resulting alcoholic solution.

2. A method as claimed in claim 1, wherein hydrolysing is effected with a solution of sulphuric acid by heating for at least four hours at a temperature of at least 80°C.

3. A method as claimed in claim 1 or claim 2, wherein the accompanying saccharides are eliminated by the action of a yeast.

4. A method as claimed in any one of the preceding claims, wherein clarifying of the solution is accomplished by means of a three- to five- fold volume of ethanol or methanol.

5. A method as claimed in claim 5, wherein the ethanol or methanol is first heated.

6. A method as claimed in any one of the preceding claims, wherein the slices are hydrolysed with acid by counterflow.

7. A method of preparing L-arabinose substantially as hereinbefore described with reference to the Examples.

8. L-arabinose whenever prepared by the method according to any one of the preceding claims.

H. D. FITZPATRICK & CO.,

Chartered Patent Agents,

14/18 Cadogan Street,

Glasgow, C.2.

— and —

27 Chancery Lane,

London, W.C.2.